Space Weather Technical Forecast

Issued on Saturday, 13 November 2021 at 12:07 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: No significant activity.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity was Low, with two sunspot containing active regions on the Earth-facing Sun. AR2894 Cso/Beta in the southwest showed some brief development, and was the source of a C1 flare at 13/0843 UTC. AR2895 Axx/alpha has continued to gradually dissipate. No Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind, as measured at L1 by DSCOVR was characteristic of the slow wind, with speeds declining from 400 km/s to 330-380km/s. Density was around average or just below. The strength of the interplanetary magnetic field, (IMF) was weak, below 6nT with north-south component, Bz ranging from +5 nT to -3 nT. The phi angle was negative (towards the Sun). Geomagnetic activity remained Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) as measured by GOES-16, remained at Background. The high energy electron flux (greater than 2 MeV) remained moderate, with peak 895 pfu at 12/1515 UTC. The associated 24-hour integrated fluence remained below the Active threshold (1e8 integrated pfu) with a 13/0000 UTC observation of 3.47e7 integrated pfu.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Very Low to Low, with a chance of C-class flares, primarily from AR2894 in the southwest quadrant.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs. Background solar winds are expected, with no notable enhancement through the forecast period. Geomagnetic activity is expected to be mostly Quiet, with a slight chance of Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The high energy (greater than 10 MeV) proton flux is expected to be background. The high energy electron flux (greater than 2 MeV) is expected to be mainly at moderate to background levels with the corresponding 24-hour electron fluence remaining below the Active level (1e8 integrated pfu).

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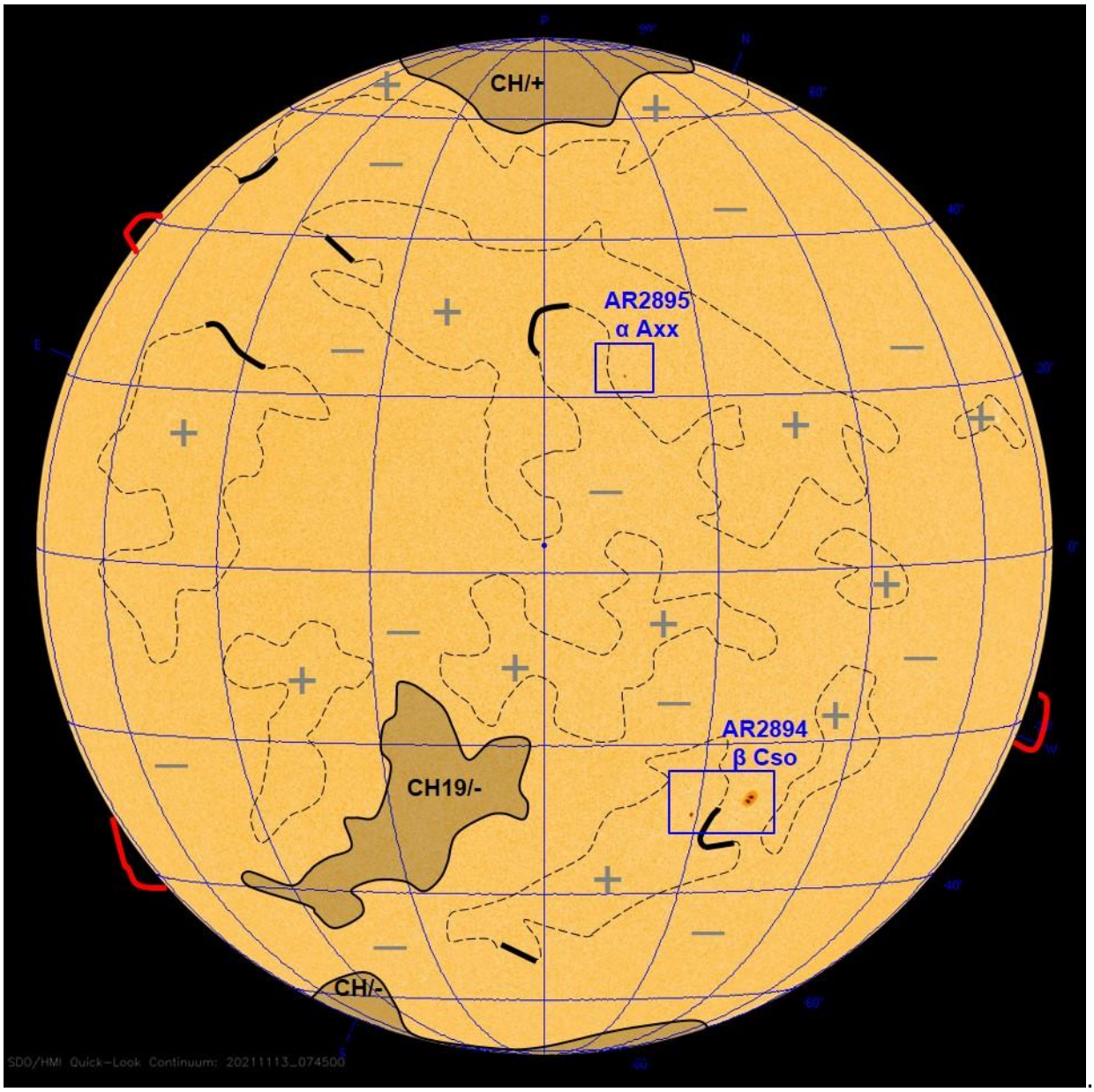
Figure 1. Solar Analysis Valid *.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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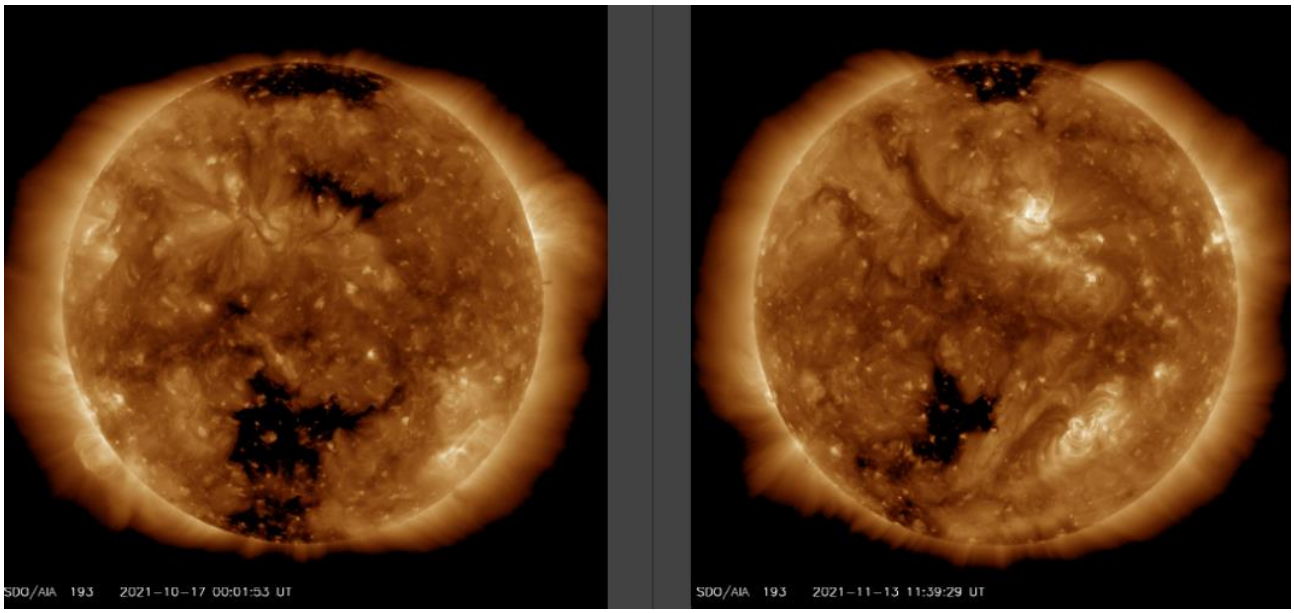
Geomagnetic Storms:

No Earth-directed CMEs have been observed. Solar winds are currently at background and forecast to persist generally at this level. There is a slight chance of a weak enhancement day 1 (13th) due to the arrival of any fast wind from a coronal hole that was visible 48-72 hours ago on the southwest solar disc. The fast wind of coronal hole 19 is expected to arrive day 5 (17th), just outside of this forecast period, but with a slight chance of arrival late day 4 (16th).

Geomagnetic activity is expected to be mostly Quiet, with a slight chance of increasing to Unsettled at times.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Figure 2: SDO AIA-193 of previous rotation (left) and current rotation (right). Northern CH on previous rotation, coupled with retrogressed southern hole limits the value of persistence.



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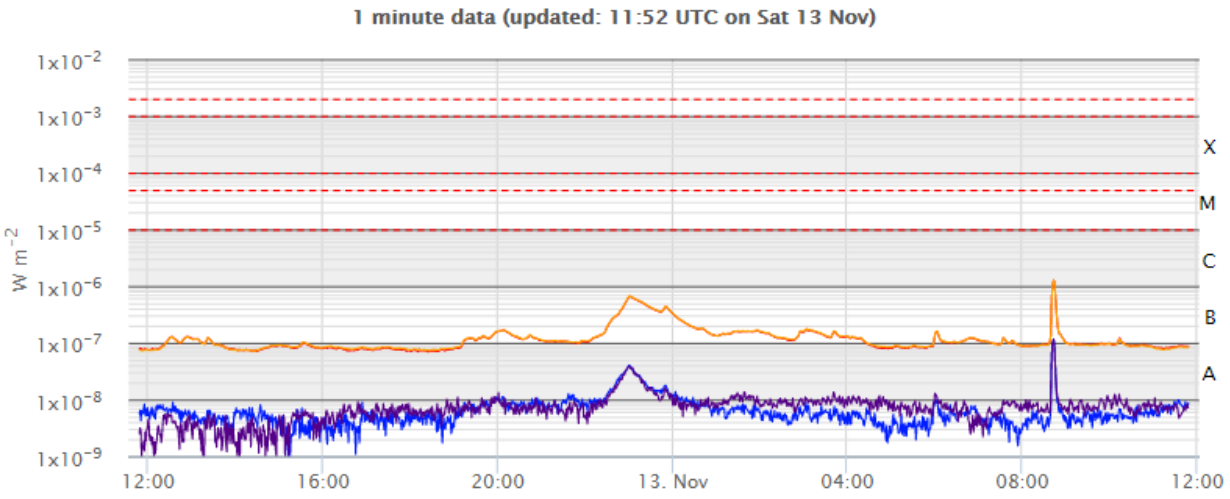
Radio Blackouts - X-Ray Flares:

Solar Activity is currently Low, with only two small and simple sunspot containing active regions. Both are traversing across the western hemisphere, with the most active region being the southern bipolar sunspot AR2894 Cso/Beta, which the source of a C1-flare at 13/0843 UTC. The other region is a very small and dissipating region, AR2895 Axx/Alpha in the northern hemisphere.

Solar activity is anticipated to remain Very Low to Low, with a chance of further C-flares from AR2894.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	2	2	2	2
Very Active	R3 to R5 X Class	No	1	1	1	1

Figure 3: GOES-16/17 X-ray Flux



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Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) as measured by GOES-16, remained at Background during the previous 24 hours, and is currently forecast to remain at this level through the period.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	1	1	1	1
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

High Energy Electrons Event (≥ 2MeV):

The high energy electron flux (greater than 2 MeV) as measured by GOES-16 at GEO is currently a background to moderate levels, with only a slight chance of reaching briefly peaking at high (above 1000 pfu). No notable sources of further enhancement are anticipated through the period.

The associated 24-hour electron fluence is expected to remain below the Active (1e8 integrated pfu) threshold, with a gradual declining trend. REFM is currently giving good guidance.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	No	1	1	1	1
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	1	1	1	1

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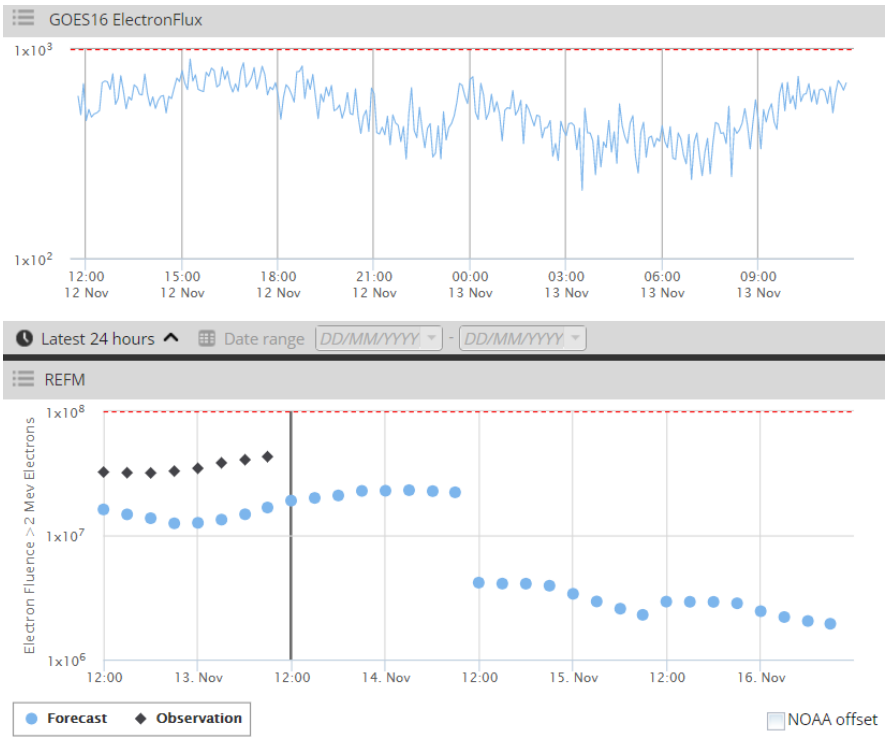
Figure 4: GOES-16 >2 MeV Electron Flux and associated Fluence



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